SCIENCE AND INVENTION.

PURE WATER AS A POISON.

WE are assured by Dr. Koppe in the *Deutsche medicinische Wochenschrift* that chemically pure water is actually poisonous, on account of its action as a solvent of the salts from the animal tissues. Physicians who prescribe distilled water for their patients are thus, according to this authority, doing them actual injury, while those who give mineral waters are acting on correct principles, since these contain already so much salt that they can not absorb any more. We quote portions of an abstract of Dr. Koppe's article in *The National Druggist:*

"By 'chemically pure water' we usually understand perfectly fresh, distilled water, whose behavior and properties are well understood. It withdraws the salts from the animal tissues and causes the latter to swell or inflate. Isolated living organic elements, cells, and all unicellular organisms are destroyed in distilled water—they die, since they become engorged therein. They lose the faculty, upon which life depends, of retaining their salts and other soluble cell constituents, and consequently these are allowed to diffuse throughout the water.

"Distilled water is, therefore, a dangerous protoplasmic poison. The same poisonous effects must occur whenever distilled water is drunk. The sense of taste is the first to protest against the use of this substance. A mouthful of distilled water, taken by inadvertence, will be spit out regularly. . . . The local poisonous effect of distilled water makes itself known by . . . all the symptoms of a catarrh of the stomach on a small scale.

"The harmfulness of the process, so much resorted to to-day, of washing out the stomach with distilled water, is acknowledged, and we find the physicians who formerly used that agent are now turning to the 'physiological solution of cooking salt,' or 'water with a little salt,' or the mineral waters recommended for the purpose. The poisonous nature of absolutely pure water would surely have been recognized and felt long since, were it not that its effects, in their most marked form, can seldom occur, for through a train of circumstances, 'absolutely pure' water can rarely be found. The ordinary distilled water, even when freshly distilled, is not really absolutely pure, while that used in the laboratories and clinics is generally stale, has been kept standing in open vessels, generally in rooms where chemicals of every sort abound and whose gases and effluvia are taken up by the water."

This poisonous action of pure water is, according to Dr. Koppe, responsible for some of the unexplained effects of administering ice to invalids. He says:

"Patients with hitherto perfectly healthy stomachs, who, after operations, are for any reason allowed to swallow 'ice pills,' . . . not infrequently contract catarrh of the stomach. There are well-known sequelæ of the use of ice, but up to the present no reasonable hypothesis has been offered as to the etiology of the same. It has been charged, it is true, to the 'bacteriological contents' of the ice, but examination of the latter has demonstrated it to be almost free from bacteria such as would account for the phenomena, tho otherwise frequently containing bacteria. As a remedy our clinicians say we must use only artificial ice, made from distilled water. Well, it is possible that artificial ice may be better borne than the natural, but it is not because it is purer than the latter, but *exactly the contrary*. It is simply because that the melted water thereof more closely approaches our ordinary drinking-water.

"This point in the care of the sick, which is certainly worthy of investigation and explanation, finds its analogy in the daily experiences of the traveler in the high mountainous regions. The guide-books warn him against quenching his thirst with snow and glacier water, and the waters of the mountain brooks as well, for, as is well known, these not only do not quench thirst, but give rise to much discomfort. . . . . .

"The harmfulness of glacier water, like that of the pure, cold mountain brooks, most of which, indeed, spring from glaciers, arises from the fact that they are exceedingly pure waters and produce identically the effect of the use of distilled water—they are poisonous. The supposition that the coldness of the water causes the sick, uneasy feelings can not stand for a moment, tho this coldness is very probably the reason that its unfitness for use is not at once recognized and the liquid rejected.

"The last link in our chain of prolegomena is found in the case of one of the Gastein springs. The water of this spring has an electrical conductivity of 31.9, therefore far excelling ordinary distilled water in this respect, and hence, according to our proposition, its use should demonstrate the poisonous nature of pure water. By a most strange coincidence, from the oldest times, for hundreds and hundreds of years, this spring has been known as the *Gift-brunnen*—the 'poison spring.' Its water is never drunk, it is commonly regarded as poisonous, altho no chemical examination of it—and they are almost innumerable—has yet been able to detect the slightest trace of any poisonous substance. Its poison lies in the fact of its extreme purity! This, we know, is a proposition that nobody will take in earnest—still, it is devoid of anything wonderful in a physiological point of view, and, furthermore, it is borne out by fact."

THE SECRET OF THE KEELY MOTOR.

IT is announced by the press that unmistakable evidence of the fraudulent character of the Keely motor has been discovered in Keely's laboratory in Philadelphia, thus confirming what all scientific men have long believed of it. The story of the discovery is thus told in *The American Machinist*, January 26:

"These later revelations are the results of an investigation of the building occupied by Keely as a workshop, and in which the exhibitions of his apparatus were made from time to time. The undertaking was instituted by the Philadelphia *Press*, and was conducted by a number of eminently competent persons, including the reporters of the newspaper, Prof. Carl Hering, consulting electrical engineer; Prof. Arthur W. Goodspeed, assistant professor of physics of the University of Pennsylvania; Prof. Lightner Witmer, professor of experimental psychology, of the same institution, and eminent as a student of and authority upon delusions; Dr. M. G. Miller, Coleman Sellers, Jr., and Mr. Clarence B. Moore, son of the late Mrs. Bloomfield Moore, so much of whose money had been absorbed in the Keely schemes.

"The facts brought out by the investigations were, after all, only such as could have been easily discovered by less eminent and talented men, if they had been permitted to do so. The building was of a type quite common in Philadelphia. It was a two-story structure, built on a low foundation without cellar, and was 18 feet front and 45 feet deep; the upper story being, however, only 40 feet deep. There were three rooms on the ground floor and two rooms above, with stairway and hall, and an office partitioned off from the front room above. Every particle of the flooring and ceiling was torn out and the walls were closely examined. A lot of trap-doors were found in the floors, varying in size from 1x1½ feet to 3x6 feet. Five of these were in the front room on the ground floor, four in the middle room, and one in the back room, while on the second floor there were a 3½-foot trap-door in the center of the front room, a 4x4-foot trap in the center of the back room, and seven small traps distributed about other parts of this floor. Under the floor of the middle room on the ground floor there had been previously discovered a hollow spherical vessel, said to be of steel, to weigh three tons and to be capable of sustaining an internal pressure of 25,000 pounds to the square inch. This vessel was near one of the trap-doors and was buried in earth and shop refuse. To put it in the place where it was found, sections of two of the floor beams had been cut away and afterward replaced. The vessel had a hole in the top tapped for pipe. Four feet away from this, and with an end just within the trap-door, was a piece of heavy iron pipe, 14 feet long, with elbows on each end. Under the other trap-doors nothing was found but heaps of ashes lately placed there. A false ceiling of wood had been put into one of the upper rooms, with a space of 2 inches between the boards and the timbers where pipes or wires might have been concealed, but none were found there. The floor of the back room up-stairs was somewhat higher than that of the others, and on tearing this up a piece of small tube, at first thought to be wire, was found running through holes bored in the floor beams. Mr. Sellers had previously found a similar piece of tube built into the partition wall almost opposite to where this

was found. This had been put in after the wall was built, as the plaster was different from the original. The small tubes found are identical in size and appearance to others which appeared attached to the Keely machine, and which he asserted were merely wires for transmitting the vibratory movements."

The American Machinist comments on these discoveries as follows:

"This investigation we can scarcely avoid regarding as somewhat of the character of an autopsy. The facts discovered speak for themselves in a way which makes it quite unnecessary for us to offer a word of comment. These things are found after those who are still financially interested in the motor have taken away every portion of the apparatus that was ever visible to the public and much that was never exposed. If an investigation of the entire plant could have been permitted, it seems certain that functional relations could have been traced between the heretofore visible portions and those now for the first time revealed. Why should these things have been concealed? If there are those who can conceive that the concealment was consistent with any honest purpose, we are not to be counted with them, and there never has been a day when we could have been counted with them. While for so long a time the Keely motor, and the performances connected with it, were so prominently and so persistently kept before the public, it came in our way from time to time to speak of the matter, but we have never said anything calculated to foster any hope that there could ever come out of it anything commensurate with the claims advanced, or in fact anything of value to the world. Mr. Keely's ways were not the ways of an honest and truthful man, nor the ways of an inventor or discoverer of anything great, and that he was so long successful in his career is one of the marvels of the age, and all his apparatus is well deserving of a place in some museum where it may stand as a warning to the overcredulous, whom, like the poor, we have always with us."

These same facts are thus treated in *Electricity*, January 25:

"This investigation, which was carried on under the supervision of several well-known scientists, would seem to prove conclusively—what had long been suspected by clear-sighted persons—that the unknown motive power made use of to operate the so-called Keely motor was nothing more nor less than compressed air or gas ingeniously applied. . . . Owing to the laboratory having been dismantled and all the machinery removed by the Keely Motor Company, those seeking for information were at a disadvantage, having practically nothing but the floors and walls of the apartment to work upon. These were torn up or demolished, with the result that small brass tubing was found concealed in the brickwork and under the floor of the laboratory. This tubing was of a kind to withstand a heavy pressure, and taken in connection with the large steel sphere discovered a week or so ago under the floor is significant, to say the least. Mr. Keely, moreover, is on record as having frequently stated that no tubing of any kind was necessary in connection with his 'etheric vapor,' and that wires only were required. In view of this statement and of the fact that visitors were allowed only in certain portions of the laboratory and never permitted to approach too near to the machines, it would seem conclusively proven that no new or unknown force was ever made use of. . . . . .

"In view of what has lately come to light the Keely motor will undoubtedly go down in history classed in the same category with the electric-sugar-refining scheme and the electrolytic process of extracting gold from sea-water."

The Scientific American says:

"The result proves not merely that the motor was a fraud, but that it was a fraud, as we pointed out fifteen years ago in the columns of this journal, of the very simplest and most transparent kind; in fact, the presumption is strong that this most colossal humbug of the century depended for its success upon that ever-fruitful theme of the bogus-company promoter — compressed air. . . . . .

"In conclusion we would remind our readers that the death of this prince of rogues does not imply that the type is extinct; and that 'resonators,' 'vibrators,' 'etheric vapors,' and others of that ilk, still walk the earth dressed in the ever-varying garb with which such human sharks as Keely are still seeking to catch the unwary."

On the other hand, there are some who still cling to their belief in Keely and his work. Some of his old supporters, while accepting the facts as found by the committee, refuse to accept their inferences of fraud. That the evidence is not yet well-rounded and complete is pointed out by a correspondent of the *The Electrical Review*, signing himself "T. J. M.," who starts out by avowing his belief that the Keely motor was only a clever trick, and then goes on to say:

"But it strikes me the discoverers who have dug up the floors of the old Keely shop have not quite redeemed their reputations for high-class work. A lot of pipes were found, all with thick walls and small bore, such as would be required for air or gas under high pressure. At once the conclusion was announced that the great mystery was no mystery, only a mere transmission of power by air or gas under extreme high pressure, and that it was easy enough for any one to connect the generator with the motor by a single wire-like tube and produce motion and manifest power.

"But it seems to me that is an insufficient explanation. Air or gas under pressure of 1,000 or 2,000 pounds per square-inch pressure could carry a lot of energy in a small pipe; but the energy could only be released into motion by allowing the air to expand in producing such motion. Such expanded air must have an outlet from the machinery to the atmosphere, unless a return pipe of very much larger bore carries it back to the compressor.

"Keely could, of course, easily have had a portable hand compressor capable of packing into a satchel, and as his rule required twenty-four hours' notice for demonstrations, even such a device could in one night be used to store much power in his big steel reservoir. But the investigating committee do not seem to have found any trace of such returning pipe nor any way of concealing the necessary outlet for the exhaust.

"Further, if the writer's memory is not at fault, Keely years ago publicly announced that for the time he was stalled because he could not get iron or steel pipe strong enough to withstand the enormous pressure of his 'etheric force.' Lap-welded iron pipe of the best and toughest iron, three fourths of an inch in diameter and about one-eighth inch bore, was made for his use and it was ripped open, and burst specimens were shown. Such pressures, whether of gas or liquid, could not have been carried by the brass tubing found by the committee.

"I call attention to this apparent gap in the work of investigation, and I believe if some of the committee were to try to design the 'simple' air apparatus in its entirety they might be considerably bothered, and find the solution of the fraud on the compressed-air theory about as much of a job as they wish."

If one must be the victim of a fraud, it is some consolation to have the fraud a gigantic and world-renowned one, and this the Keely motor certainly seems to have been. It is figuring even more to-day in the public press than it did when the "inventor" was alive and selling stock, and the end is not yet.

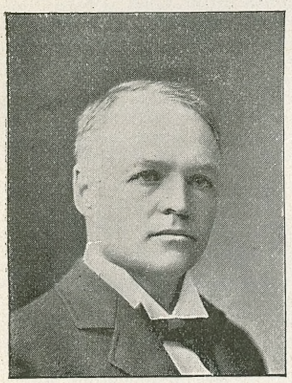
The Proper Reading Distance.—"At a distance of several meters or yards," says Dr. Norburne B. Jenkins in *The Medical Record* (December 24), "little or no muscular effort is required for the normal eye to see objects distinctly; but an extreme exertion of the ciliary muscle, which controls the crystalline lens, is necessary if the vision be directed to an object a few centimeters or half-inches distant from the eye. The following may illustrate the work of the muscles of the eye in reading at several distances: A sheet of paper, about twenty centimeters (eight inches) square, printed with type sufficiently large to be easily read at five or six meters or yards, is placed at this distance from a person with normal or emmetropic eyes. Practically no contraction of the muscles of convergence or of the ciliary muscles is necessary in order to read the type. Should the paper be placed a meter or yard from the eyes, the ciliary muscles and the muscles controlling the motions of the eyeballs are called upon for additional work, but no inconvenience is occasioned to emmetropic eyes by prolonged vision at this distance. If the paper now be placed within a few centimeters or half-inches of the eyes,

the ciliary muscles contract to their utmost. The internal recti likewise are in a state of extreme exertion, in accomplishing the convergence necessary, in order that both eyes may see the same type at the same instant. The muscles are no longer adequate to the increased tension. They become exhausted and the vision is embarrassed. The type is alternately blurred and distinct, in consequence of the alternate failure and recovery of the muscles. Should this process continue for many minutes, pain and vertigo come on, and the sufferer is forced to direct his vision from the paper. The nearer objects approach the eyes, the greater will be the necessary muscular effort and the sooner will the muscles refuse to perform their functions; the farther the type is held from the eyes, the less is the requisite muscular effort; hence it is probable that the farthest point at which distinct reading-vision is possible is the proper distance for continuous reading. Probably this point is more than thirty-five centimeters (fourteen inches) distant from the eyes, and is dependent upon the strength of the muscles, habit, and the visual acuity."

THE KNAPP ROLLER-BOAT.

THE roller-boats do not seem to be having an easy time of it. M. Bazin's, which was to do such great things, was a failure, and Mr. Knapp's, at Toronto, made only six miles an hour. The American inventor, however, tells us that this is the fault of the engines, and he is building a bigger vessel, which will be differently propelled. Experts look on askance, but Mr. Knapp is undismayed, and contributes a description and defense of his boat to *The Marine Review* (Cleveland, Ohio, January 12). He says:

"I am satisfied that sufficient power can be applied to get practically unlimited speed, with a light draft, in this type of vessel, with little cost.

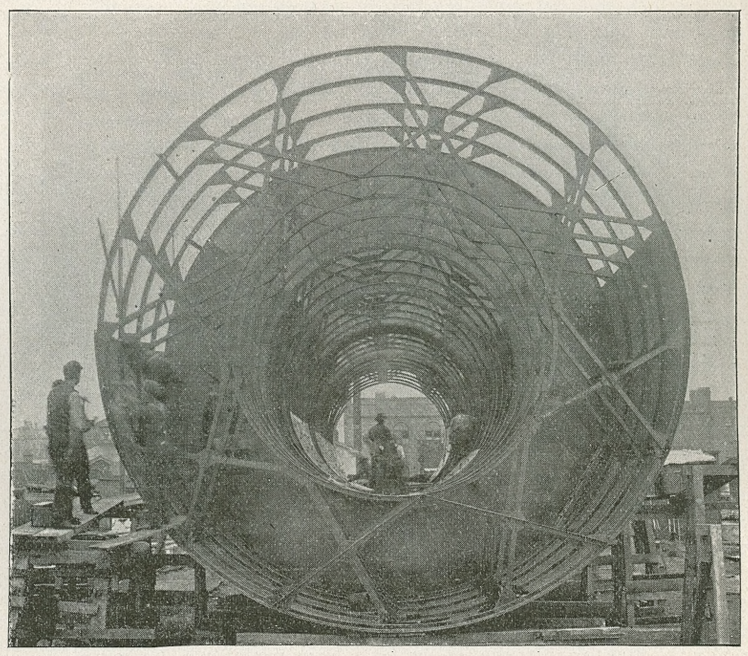


F. A. KNAPP,
Inventor of the Roller Boat.

"I utilize the forces of nature, which aid me to get speed, while the present type is fighting nature. Consequently, I will not need anything like the same amount of power, with vastly greater results. The Frenchman Bazin, lately deceased, who has been called an eminent engineer, could not succeed in getting high speed because of another principle involved which he appears to have ignored, if he was aware of it, viz., the resistance of the water to the forward motion of the plow. His disks being thick at the center and thin at the circumference, always largely submerged, were in effect plows. He only talked of reducing skin friction, and so he would by that mode, but skin friction cuts very little figure at high rates of speed, even at 20 knots.

"The *Campania* takes 30,000 horse-power to get 20 knots, while the *St. Louis* takes 20,000 horse-power to get 19 knots. It is not skin friction but the resistance to displacement of the water at the bows they must overcome, this resistance increasing as the cube of the velocity at this speed and in an unknown quantity beyond that rate. This type is built with fine lines to get the least possible resistance, but the *Turbinia*, with her 50 horse-power per ton of displacement, rose her bow out of the water, and her fine lines were in the air; she could not keep her bow in the water with this great resistance, and therefore she might just as well have been built with a square bow. The *Campania* takes 2½ horse-power per ton of displacement, while my vessel will take about one ninth of a horse-power per ton of displacement, as proved by my experiments at Toronto.

"My theory is that rolling broadside on over the water, I very quickly obtain a resistance which tends to lift my vessel to the surface. As water is incomprehensible [incompressible?] and can not be displaced quickly, I roll over it instead of through it, and

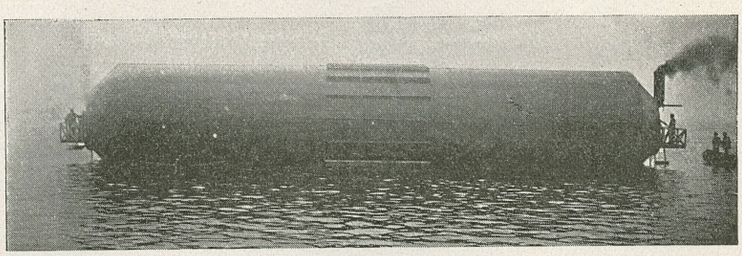


THE KNAPP BOAT IN PROCESS OF CONSTRUCTION.

it becomes a granolithic pavement, so to speak, under my vessel, because a body can only displace its own weight in water, and as soon as the resistance exceeds the weight of my vessel, it must practically be rolling on top. Then, like the railroad train running up a grade, it takes less power on the level, and so I get great speed with less power. This is at a light draft of say 12 feet in a diameter of 200 feet.

"I am told, however, by some engineers, who either can not comprehend the principles involved or have not given the subject sufficient consideration, that such a vessel, exposing so great a surface, can never be propelled against a gale of wind, and they instance the *Campania* drawing 33 feet of water, or say two thirds of her in the water, while nearly all of my boat is out of the water and exposed to the wind. Now it is not the wind that affects the *Campania*, but the water which strikes her with all its momentum, weighing 64 pounds to the cubic foot, the wave motion having a speed of say 70 feet per second; on the other hand, the wind is striking the one third of her which is out of the water with a pressure of a few pounds to the square foot.

"Water is 825 times heavier than the air, but the *Campania* goes through it, necessarily at a reduced speed. With my vessel, the resistance of skin friction and the blow of a wave which is much below the center, knocking her legs from under her so to speak, are aids to speed. I turn the enemy into a friend and am working with nature instead of fighting her. The wind can no more stop my vessel, weighing 17,000 tons and upward, according to her load, than it can a railroad train. . . . . .



THE KNAPP ROLLER BOAT BUILT AT TORONTO, CANADA.

"I may say that I have many broad scientific men and several eminent engineers and naval architects who fully agree with me."

Mr. Knapp proposed to the Government to build a troop-ship for 30,000 men on his principle. Some of the features of this vessel, which would be 800 feet long and 200 in diameter, were to be eight decks of varying sizes, each 8 feet 3 inches from floor to ceiling; 780 compartments 62.8 feet long, between the intermediate and outside skins, and 600 more between the intermediate and internal skins; an engine compartment in the middle of the ship, 200 by 168 feet, swung on journals at each end, and cabins swinging in like manner but independently. In the very bottom was to be a tank sufficient to carry enough fresh water to feed the boilers. The coal-bunkers were to have a capacity of 3,000 tons. Uncle Sam has not yet accepted this offer, and indeed he could scarcely be expected to do so. After all, performance is the conclusive test of every promise, and when Mr. Knapp's boat has raced with the *Campania* and beaten her, he may then build vessels by the dozen and ask his own prices.

TRIPLE SCREWS ON NAVAL VESSELS.

IN an article on "Readings from Experience in Naval Engineering," in *The Engineering Magazine*, February, Commodore George W. Melville, Engineer-in-Chief of the United States navy, gives the following interesting particulars regarding the use of triple screws:

"The use of multiple screws dates back a considerable period, for what were known as the 'tin-clads' on the Mississippi during the United States Civil War had four screws. The French were really the first to use triple screws for a large vessel, which they decided upon as a result of careful experiments on a steam-launch. Before the *Dupuy de Lome* had been launched, when it was arranged to build for the United States two commerce-destroyers, or 'pirates,' as they were familiarly called for a long time, it was decided to use three screws for constructive reasons, and with the idea that, for ordinary cruising, it would be more economical to run with a single screw than with two, on account of the fact that cruising power for one engine of three would form a larger percentage of its maximum power than it would in the case of each of the larger engines of twin screws.

"When the *Columbia* and *Minneapolis* were tried, it was found, to the great astonishment of everybody, that apparently their economical performance was higher than that with twin screws. The determination of the speed was beyond question, and the accuracy of the power measurement was thoroughly verified, so that, whether the economy was due to the use of three screws or not, it is undoubtedly a fact that these two vessels showed a smaller horse-power per ton of displacement at their maximum speeds than that shown by similar vessels with twin screws. That this economy is due to triple screws has been disputed, and it is claimed that tank experiments in England have demonstrated that there is no economy in the use of three screws rather than twins; as a result, in the English navy no vessels have been built with triple screws. Exactly the opposite of this is true in France, Germany, and Russia, where nearly all the recent vessels of large power (more than thirty in number) have been built with triple screws, and it is probable that in the next lot of vessels the United States will adopt the same plan.

"The results at Santiago showed that three screws have a tactical advantage over the other method, combining economy and great power where two sets of engines are placed on each shaft. The *New York* and *Brooklyn* are each fitted in this way, and on the day of the battle each was cruising with her forward engines uncoupled. There was not time to stop for coupling up the forward engines, which, moreover, were not warmed up and ready for use, and, as a result, the vessels could work only at half power. Had they been fitted with triple screws, the engines not in use could have been started as soon as they were warmed up, and thus full power would have been attained in a short time, even had all the engines not been in readiness at the moment of the sortie.

"It may be remarked in this connection that triple screws would have many advantages for the high-speed merchant steamers now becoming common. The great advantage possessed by twin screws in the security against total disablement would be emphasized in the case of triple screws, as the breaking of the shaft would reduce the power only one third instead of one half There would also be the great benefit of a reduction in the size of parts, as the engines now built are very large. It would be the greatest advertisement that any company could have, and would undoubtedly attract passengers. This is shown by the action of a prominent United States Senator some years ago, who, after buying a return ticket and finding that it involved traveling on single-screw ships, disposed of it at a considerable loss, that he might go by a twin-screw vessel."

Volcanic Dust as a Fertilizer.—"In his *Cours de Geologie*, M. Nivoit shows," says *Cosmos*, "how geology enlightens the agriculturist on the formation of arable soil and on the elements that compose it, on the constitution of the subsoil, and on the influence that this can exercise on vegetation by its physical state, by its greater or less permeability. He cites, among other examples of the mechanical action of the atmosphere, the movements that are susceptible of exercising favorable action in certain regions. The air is almost always transparent to the west and southwest of Puy-de-Dôme, while it is turbid to the east and southeast. This is due to the transportation of the cinders or volcanic ash so abundant in the mountain groups of Puy, Mont-Dore, and Cantal. This ash, which can remain suspended a long time in the air on account of its lightness, contains fertilizing elements, notably phosphoric acid and potash, and thus carries these substances to the regions whither it is wafted; rain and snow aid in bringing it to earth. In Limagne the weight of the volcanic dust deposited on a hectare [about 2½ acres] of land may be estimated at 1,000 kilograms [2,204 pounds] yearly. Thus is explained the inexhaustible fertility of this country where all crops succeed perfectly." — *Translation made for* THE LITERARY DIGEST.

SCIENCE BREVITIES.

MAN AND MONKEY.—Under the title "L'Homme et le Singe," the Marquis de Nadaillac, in the *Revue des Questions Scientifiques*, October, 1898, criticizes the alleged descent of man from the anthropoids. "He points out forcibly," says Dr. D. G. Brinton, in *Science*, "how many assumptions, without positive support, underlie the general theory of evolution, and especially the evolution of man from any known lower type. At the same time, he does not pretend that our present knowledge is decisive, either for the negative or the affirmative." "At the present time," says Nadaillac, "in view of what is actually known, we are not prepared to deny the possibility of any such theory; but, I hasten to add, we are just as little prepared to affirm it as a truth." "Such caution," Dr. Brinton adds, "is certainly in season, as the tendency is constant to hasty conclusions."

"WAS primitive man a modern savage?" is the question asked by Dr. Talcott Williams in the Smithsonian Report, just issued, and answered by him in a constructive negative. "To Dr. Williams," says Dr. Brinton, in *Science*, "primitive man was a peaceful, happy creature, knowing not war or cannibalism, with a 'surprising primitive development,' which later on degenerated into civilization. This early man enjoyed 'a juster conception of the divine' than his descendants. His gods were peaceful, communication free, hospitality open. 'The earth was still empty and happy and young.' If Dr. Williams intends this as a pleasant, humorous sketch, it will pass; if a serious inference from the ascertained facts of prehistoric investigation, its author is about a century behind time, as every student of the actual remains of earliest man knows the painful but irrefutable evidence of his worse than barbarous, his really brutal, condition, apart from all comparisons with modern savages."

"THAT there is something more serious than the mere wound in the bite even of a healthy animal," says *Appleton's Popular Science Monthly*, January, "is attested by Mr. Pagin Thornton. . . . 'And what is more surprising to me,' he says, 'is that some of us may have hands crippled for some time from bites of a man's teeth." Dog-bites are always dangerous, but largely from the size of the wound which a dog biting in earnest will inflict. With men they usually fail to do their best. Animals recover from wounds more easily than men do; but Lord Ebrington says that deer bitten by dogs in Exmoor hardly ever recover. Much of the poisoning caused by bites is supposed to be due to the state of the animal's teeth; and in this way the bite of a herbivorous animal, whose teeth are usually soiled, may cause worse after-affects than that of a carnivora, whose wet mouth and wet tongue keep its teeth fairly clean. A similar difference is observable in the effects of being clawed and bitten by carnivora. Wounds made by the claws of leopards are poisonous, while those caused by the teeth are rarely septic. The force with which a bite in earnest is inflicted is an important element in its dangerous character. 'It seems,' says the London *Spectator*, 'as if for the moment the animal threw all its force into the combination of muscular action which we call a "bite." In most cases the mere shock of impact, as the beast hurls itself on its enemy, is entirely demoralizing, or inflicts physical injury. A muzzled mastiff will hurl a man to the ground in the effort to fasten its teeth in his throat or shoulder. Then, the driving and crushing force of the jaw muscles is astonishing.'"